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METEOROLOGY AND AGRICULTURAL MELIORATIONS

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Agricultural meliorations are concerned with the economy of water on cultivated soil. Their main task is to improve the hydrological conditions on farmlands, meadows, pastures, gardens and orchards all of which are under the direct influence of atmospheric precipitation - as well as in hot houses which are protected from snow and rain and to which water must be conducted artificially.

A plant takes water from the moisture in soil. However, the humidity in the air and its undersaturation is of great importance, because they influence the evaporation from the soil and the

transpiration of plants. For this reason, melioration technology must concern the innate disposition of climatic components and not exclude any one of them. Nevertheless, water must be singled out in all the forms in which it manifests itself.

The point of departure for the meliorater (besides counteracting the damages done by the masses of flowing water) must, therefore, be the cultivated plant and its water needs.

We realize that for plant production there is necessary a group of climatic-soil factors, among which three occupy the first place. These are the following: heat, soil, and water. However, effecting a change in the heat of the climate does not lie within our possibilities. We can only slightly improve the soil's fertility. On the other hand, much can be accomplished in the direction of enlarging or lessening the soil's moisture. For these reasons, agricultural hydrology - where the activity takes place under an open sky - must know not only the plants' need for water but also the possibilities for satisfying this need by atmospheric precipitations in the given area.

The average monthly precipitations over several years are insufficient, because there are never any average precipitations in reality. From the point of view of plant life, it is by no means

immaterial whether for instance 60 millimeters of rain fell during a month in the form of daily rains of 2 millimeters each, or one huge rain with the rest of the days dry, or even three or four separate rains that moistened the soil.

Another very important matter, apart from the amount and disposition of the precipitation during a month, is the course of plant development - especially its so-called critical time. If, for instance, the precipitation comes late and falls when the grasses are just sprouting forth instead of blossoming, this will adversely affect the yield. The same precipitation in July, which interferes with the harvesting of wheat, is an excellent stimulant to the growth of sugar beets. Large precipitation during May helps the development of plants with ears, whereas it is not desired for cultivated plants. A plant that has been excessively dried out or excessively moistened during the critical period of its development can never make up for the loss in its growth. It will remain handicapped to the end of its days and will give a small yield or none at all.

If, therefore, plant production is to be raised, we must also know (besides the hydrological need of plants) the innate disposition of climatic functions. The averages over several years

do not suffice. They only give a general characteristic of the climate, whereas it is necessary to become acquainted with the frequency with which factors appear as well as their concentration.

The development of a plant is not closely connected with calendar dates. We have earlier and later sowings, depending upon the climatic conditions in a given locality and the given year as well as upon the technical possibilities of man. In any case, there exist certain averages for the development of a given plant. We will never achieve certainty, but considerable probability does exist. However, the monthly averages are too general. It is necessary to have at least a ten-day average, in order to judge on that basis whether the climate of a described locality is suitable for the development of a given cultivated plant.

Examination of the needs of plants that are under glass roofs, in containers filled with powdered soil substance, in the heat of the air and in soil differing from the surrounding soil in the fields, with a small change of air due to the protection from the wind, with a crowded twisting of roots in a small container, and many other artificially created factors - shows that they are far from the actual development in a soil disposition under the open sky where they belong. For these

reasons, it is difficult to transfer laboratory * data into the reality of nature.

How are we to define the hydrological needs of a given plant which we cultivate in our locality?

The aim of a farmer's work is the crop from the cultivated plants. It has been ascertained many times, however, that despite the very same cultivation, fertilizer, rotation of crops, and type of plant - there occur years of good crops and others of loss, and this obtains despite the fact that diseases or plant parasites do not contribute to the poor crop.

If we, therefore, plot out the course of the weather for the year having the highest crops and compare it with the course of a year of agricultural catastrophe - over a series of years - it will be easily seen that the reasons for the different sizes in the yields are situated in the appropriate or inappropriate disposition of climatic factors.

On the basis of the years having the highest crops, one could organize a schemat for the appropriate soil moisture and the amoun of water necessary in order to attain the latter. On the other hand, agricultural catastrophes throw into relief the inadequacy or oversupply of water, which should

have been either strengthened or weakened by means of melioration techniques.

One should not hope that rain, which is accompanied by a group of climatic factors, chemical and physical properties, can be substituted for by the same amount of water artificially sprinkled or by raising the soil's moisture through some other method. Neither should it be hoped that a removal of the surplus of moisture will create similar conditions as those in a bumper crop year, because water is not the only component necessary for a good harvest. However, a supplementing or weakening of the hydrological factor during the critical period for the development of a plant will forestall any too strong fluctuation vacillation in the crop yield and will help it to approximate the average.

What real benefit can melioration technology have by profiting from and conducting meteorological observations?

1) On the basis of knowledge concerning the hydrological needs of the individual plants and the frequency with which precipitation occurs during certain periods - it is possible to plan the appropriate establishment of regions for cultivation.

2) Taking into consideration the differences in the course of precipitation during years

of bumper crops and in the average computed period, it is possible to notice the necessity for preparing water supplies for the critical periods of particular plants, so that by foreseeing a drought it will be possible to moisture the plants with an artificial supply of water.

3) By conducting experiments on a current basis and comparing them with a schemat for the years with bumper crops - it is possible to designate the quantity and the time for application of supplementary parts of water, so that crop failure will be avoided. It is also possible to counteract excessive moisture, when there is too much humidity. This latter matter is especially important for plant life on watery-earth soil.

4) It is possible to foresee already this year the size of the expected crops on the basis of the commuted relation (correlation) between the harvesting and the course of the climatic factors.

5) Taring into consideration the disposition and the concentration of climatic factors during given periods, it is possible to foresee also the appearance of parasites and plant deseases and call for combatting them.

Melioration equipment can only then give a substantial help economically, when it is planned

as a supplement in the direction of strengthening or weakening the disposition of innate climatic and soil factors. These melioration techniques will not allow a failure in crops to take place, and they will lower the vacillations in crop yield.

For these reasons, the hydrological economy of agriculture must be closely connected with, not only a general knowledge of the climate in a given area but also with, a continual observation of the course of the weather and the immediate extraction of directives for agricultural practices.

An agricultural work shop must have, besides hydrological-melioration equipment, also a conscious farmer who knows how to operate and take advantage of this equipment along the lines of hydrological economy which proceeds toward supplementing the principles of innate climatic factors for the purpose of achieving the maximum crops.

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